

An annotated checklist of the Grasses (Poaceae) of Southern Assam

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ABSTRACT: We provide a checklist of grass flora along with the details of life form a ~ 6922 km² area located in the southern part of Assam (Barak valley). This area harbors 98 grass species belonging to 49 genera of the Poaceae. Subfamily Panicoideae (52 species) had the highest number of species followed by Bambusoideae (25 species), Chloridoideae (13 species), Ehrhartoideae (4 species), Centothecoideae (3 species) and Arundinoideae (1 species), while subfamilies like Anomochlooideae, Aristidoideae, Danthonioideae, Pharoideae, Pooideae and Puelioideae were not represented. The region accounts *ca.* 32% of the diversity of grass flora of the state of Assam.

INTRODUCTION

Grasses occur in virtually every terrestrial habitat, cover as much as one-fifth of the Earth's land surface (Shantz 1954). The cereals, sugarcane, bamboos, and forage and weedy grasses are of pre-eminent importance in human economy. The grass family (Poaceae) includes approximately 11,000 species in over 700 genera (Chen *et al.* 2006). Bor (1960) has given a major contribution through his consolidated work, which excluded Bambusoideae. The detailed account on bamboos by Gamble (1896) remained the main source to determine the Indian bamboos, although two compilations on Indian bamboos have recently appeared (Tewari 1992; Seethalakshmi and Kumar 1998). At present, in India there are about 1300 grass species distributed in 25 tribes and 263 genera out of 17,500 known flowering plants (Nair and Murthy, 2012).

As far as the North-East India is concerned, Bor (1940) was responsible for the account on grass in *Flora of Assam*. Shukla (1996) has made an account on the grasses of North-Eastern India. Barooah and Borthakur (2003) reported the occurrence of 40 species of bamboos belonging to 10 genera from the state Assam. Chowdhury (2005) listed *ca.* 303 species of grasses occurring within the ambit of political boundary of Assam. Southern Assam seems to have received very little attention in the above mentioned works and are known through the sporadic reports by Gamble (*l.c.*), Hooker (1897), Bor (*l.c.*), Gupta (1972) and Bhattacharjee (2002).

Aiming to reduce the gap in the knowledge of biodiversity of North-East India, the present study has been carried out to contribute the knowledge of grass flora occurring in Southern Assam.

MATERIALS AND METHODS

Study Area

The Southern Assam or Barak Valley (Figure1) is located between 24°08'–25°08' N and 92°12'–93°15' E. The valley covers an area of 6922 km² and is surrounded

by Dima Hasao District and Jaintia Hill in the north, on the east by the Manipur hills and on the south by the Mizoram hills. To the west the plains merge with Sylhet Plains of Bangladesh and Indian state Tripura. At present the region is divided into three administrative districts, namely Cachar, Karimganj and Hailakandi. The region has 12 Reserve Forests and 1 Wild Life Sanctuary comprising a total forest area of about 2339 km² *i.e.*, *ca.* 33.7% of the total geographical area of the valley. The drainage system of southern Assam is fed by 18 major rivers and rivulets, and Barak is the chief river, flowing in the east-west direction through the central part of the valley. The region experiences hot summers interspersed with rains and thunderstorms from May–Sept., while Dec.–Jan. have the lowest temperatures. Rainfall varies between 2500 and 4000 mm, with an average of 143 rainy days per annum; temperature ranges from 7.5°C in winter to 40°C in the summer and humidity of the region varies from 60% to 91%.

The vegetation of the region predominantly consists of tropical wet evergreen to tropical semi-evergreen forest types (Champion and Seth, 1968). Tropical wet evergreen type of forest is prevalent in the northern and eastern slopes of southern Assam like Borail Hill Ranges, Upper and Lower Jiri R.F., Barak R.F. and Inner Line R.F. The dominant tree species of this type of forest are, for example, *Bauhinia acuminata*, *Callicarpa arborea*, *Carallia integerrima*, *Castanopsis lanceifolia*, *Chisocheton cumingianus*, *Duabanga grandiflora*, *Ficus roxburghii*, *Holarrhena antidysenterica*, *Mallotus roxburghii*, *Melia azedarach*, *Microcos paniculata*, *Saurauia roxburghii*, *Schefflera venulosa*, *Sterculia villosa*, *Syzygium cumini*, *Toona ciliata* and *Xerospermum glabratum* (Barbhuiya, *Pers. Obs.*).

Whereas tropical semi-evergreen type of forest is prevalent in southern and western side of southern Assam, viz., Sonai R.F., Katakhal R.F., Singla R.F., Badsha Tilla R.F., Longai R.F., Tilbum R.F., Duhalia R.F. and Patheria R.F. The dominant tree species of this type of forest

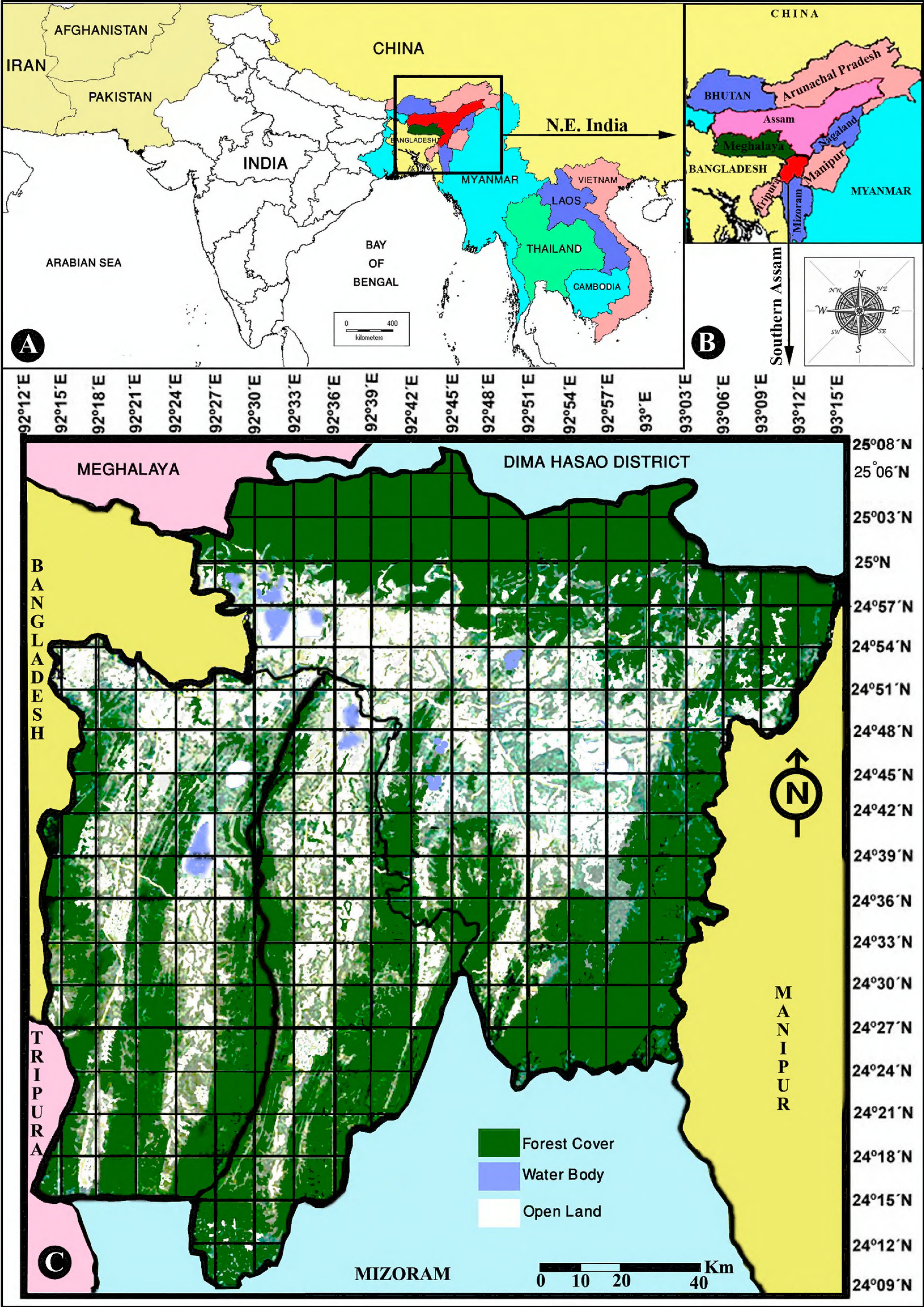


FIGURE 1. A) North-East India; B) Southern Assam; C) Grid map of Southern Assam (Barak Valley).

are, for example, *Schima wallichii*, *Saurauia roxburghii*, *Dipterocarpus turbinatus*, *Albizia procera*, *Gmelina arborea*, *Lagerstroemia speciosa*, *Macaranga denticulata*, *Mallotus nepalensis*, *M. roxburghianus*, *Phyllanthus emblica*, *Ficus bengalensis* and *F. religiosa* (Barbhuiya, Pers. Obs.).

Data collection

The species listed here were compiled mainly from the surveys in the years 2010 to 2012 covering all habitat types of the region, particularly in protected areas (Table 1). This was supplemented with a study of all the previous herbarium collections deposited at the Botanical Survey of India, Eastern Regional Centre, Shillong (ASSAM).

RESULTS AND DISCUSSION

This qualitative survey revealed the presence of 98 grass species belonging to 49 genera distributed in 6 subfamilies are here classified according to Grass Phylogeny Working Group (GPWG 2001). The number of species known from Southern Assam and the total number of species in the genus are indicated between brackets. Plant binomial along with the local name in the bracket if any, life form, voucher specimen and their location of occurrence are provided in Table 2. Those species were not collected but their presence was recorded by photographs.

Systematic overview

- Subfamily **Bambusoideae**
Tribe: Bambuseae
Genera: *Bambusa* (10/100) *Dendrocalamus* (4/40) *Dinochloa* (1/30) *Gigantochloa* (3/30) *Melocalamus* (3/5) *Melocanna* (1/2) *Pseudostachyum* (1/1) *Schizostachyum* (2/50)
- Subfamily **Ehrhartoideae**
Tribe: Oryzeae
Genera: *Leersia* (1/17) *Oryza* (3/24)
- Subfamily **Arundinoideae**
Tribe: Arundineae
Genera: *Phragmites* (1/5)
- Subfamily **Centothecoideae**

- Tribe: Centotheceae
Genera: *Centotheca* (1/4) *Lophatherum* (1/2)
- Tribe: Thysanolaeneae
Genera: *Thysanolaena* (1/1)
- Subfamily **Panicoideae**
Tribe: Isachneae
Genera: *Isachne* (3/90)
- Tribe: Paniceae
Genera: *Acroceras* (2/19) *Axonopus* (1/110) *Brachiaria* (2/3) *Cyrtococcum* (2/11) *Digitaria* (3/250) *Echinochloa* (3/45) *Ichnanthus* (1/30) *Oplismenus* (1/5) *Ottochloa* (1/3) *Panicum* (10/300) *Paspalidium* (1/40) *Paspalum* (2/330) *Pseudoraphis* (1/6) *Sacciolepis* (1/30) *Setaria* (3/130)
- Tribe: Arundinelleae
Genera: *Arundinella* (1/60)
- Tribe: Andropogoneae
Genera: *Chrysopogon* (2/44) *Coix* (1/4) *Hackelochloa* (1/2) *Hemarthria* (2/12) *Imperata* (1/11) *Pogonatherum* (1/4) *Saccharum* (4/40) *Themeda* (1/27) *Vossia* (1/1)
- Subfamily **Chloridoideae**
Tribe: Cynodonteae
Genera: *Chloris* (1/55) *Cynodon* (1/10) *Enteropogon* (1/19)
- Tribe: Eragrostideae
Genera: *Acrachne* (1/3) *Eleusine* (1/10) *Eragrostis* (2/350) *Leptochloa* (2/31) *Neyraudia* (1/52) *Sporobolus* (3/160)

Concluding remarks

Grasslands occur in alluvial plains and riparian flats throughout the valley and generally inundated every year during the monsoon period. The study has revealed the occurrence of 98 grass species belonging to 49 genera of the Poaceae in Southern Assam, which accounts ca. 32% of the diversity of grasses of the state of Assam. On the other hand, bamboos are used as the major source of fibers in local Paper Mill and, in the need of fulfilling the demands, many indigenous bamboo species (e.g. *Bambusa balcooa*, *Bambusa cacharensis*, *Bambusa polymorpha* etc.) are becoming rarer and finally approached to Near Threatened (eg. *Dendrocalamus hamiltonii*).

TABLE 1. Protected Area Network of Southern Assam.

District	Reserve Forest/Wild Life sanctuary	Area in Sq. km.	Total Forest Area of the District in sq. km	Total area of the district in sq. km	Percentage of forest area
Cachar	Borail Wild Life Sanctuary	326.5	1116.08	3786	29.48
	Upper Jiri R.F.	63.31			
	Lower Jiri R.F.	36.46			
	Barak R.F.	204.54			
	Sonai R.F.	35.97			
	Innerline R.F. (Part-I).	443.00			
Hailakandi	Katakhal R.F. (Part-II)	6.30	741.71	1327	55.89
	Katakhal R.F. (Part-I)	132.70			
	Innerline R.F. (Part-II).	609.01			
	Singla R.F.	124.39			
	Longai R.F.	151.51			
Karimganj	Badsahi tilla R.F.	75.12	480.86	1809	26.58
	Duhalia R.F	34.81			
	Tilbhum R.F	18.50			
	Patharia R.F	76.53			
Total	-	-	2338.65	6922	33.78

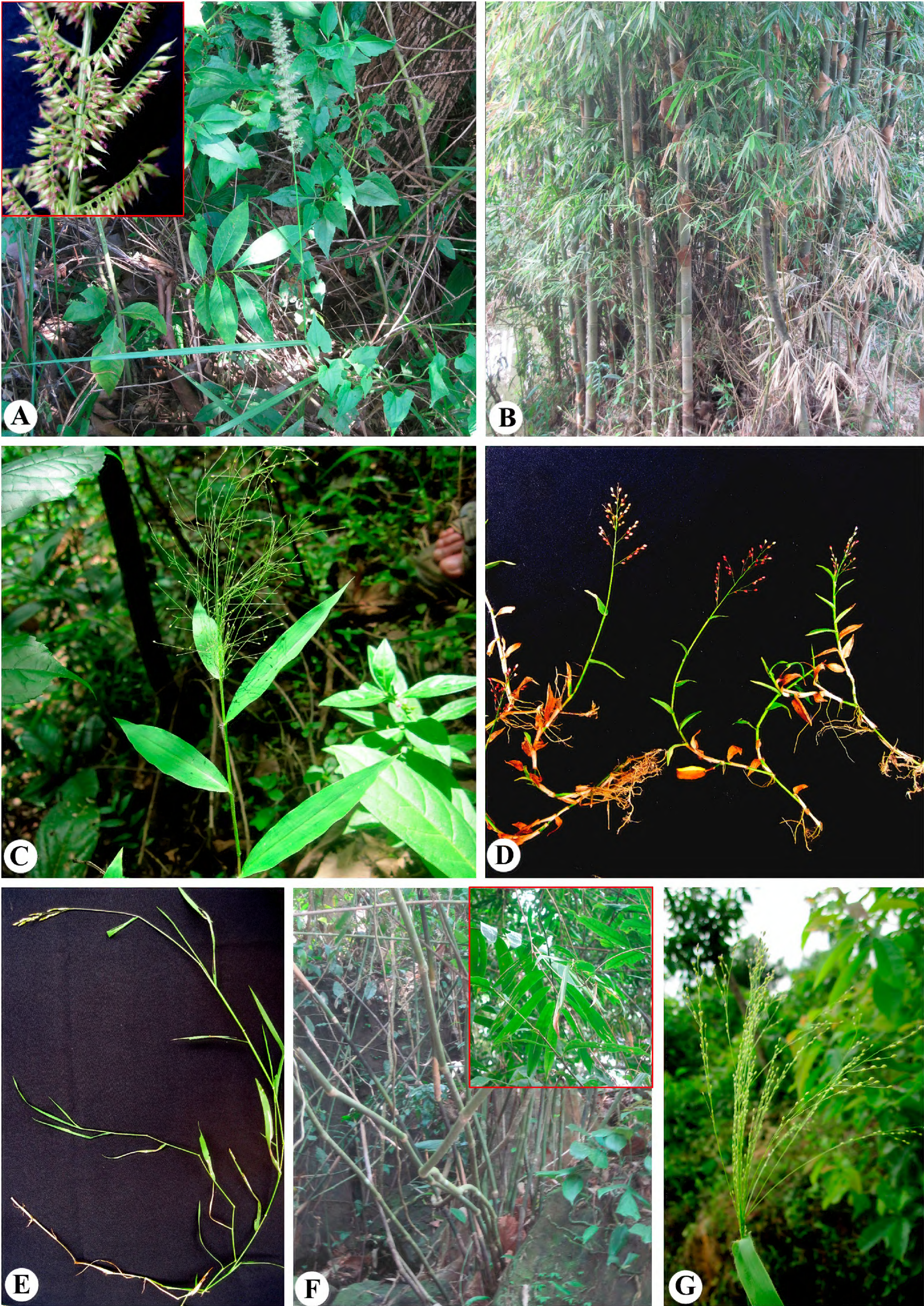


FIGURE 2. A) *Arundinella bengalensis* (Spreng.) Druce; B) *Bambusa cacharensis* R.B.Majumdar; C) *Cyrtococcum patens* var. *latifolium* (Honda) Ohwi; D) *Isachne clarkei* Hook.f.; E) *Leersia hexandra* Sw.; F) *Melocalamus indicus* R.B. Majumdar; G) *Panicum khasianum* Munro ex Hook.f.

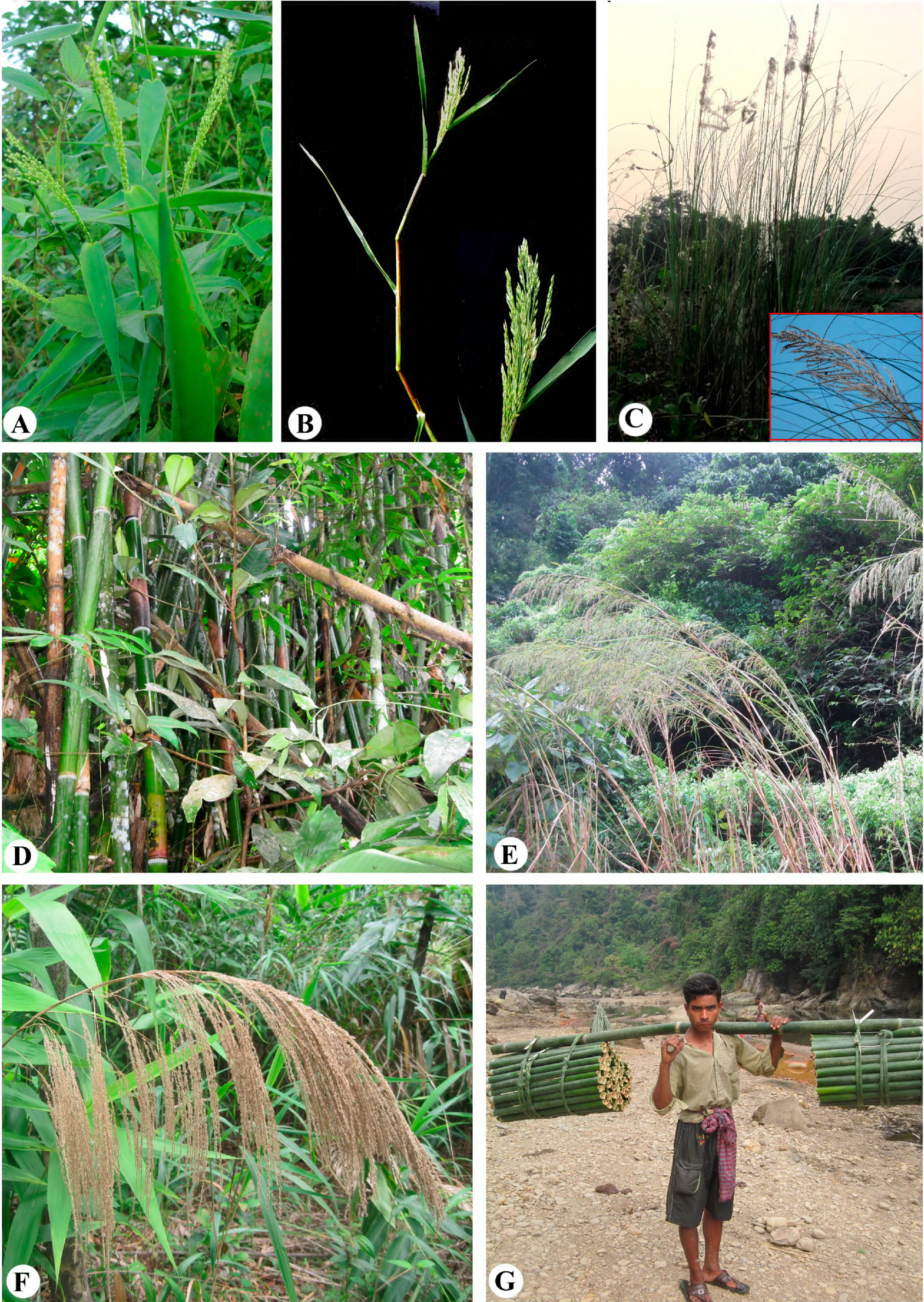


FIGURE 3. A) *Panicum notatum* Retz.; B) *Panicum paludosum* Roxb.; C) *Saccharum spontaneum* L.; D) *Schizostachyum mannii* R.B.Majumdar; E) *Themeda villosa* (Poir.) A.Camus; F) *Thysanolaena latifolia* (Roxb. ex Hornem.) Honda; G) A villager carrying culms of *Schizostachyum dullooa* (Gamble) R.B.Majumdar to the market.

TABLE 2. List of grasses of Southern Assam (Habit: H = Herb; S = Shrub); WLS = Wildlife Sanctuary; RF = Reserve Forest.

TAXON	HABIT	VOUCHER SPECIMENS	OCCURRENCE
<i>Acrachne racemosa</i> (Heyne ex Roth) Ohwi	H	H.A. Barbhuiya 264	Duhalia, Longai and Patheria RF
<i>Acroceras tonkinense</i> (Balansa) C.E.Hubb. ex Bor	H	H.A. Barbhuiya 262	Duhalia RF
<i>Acroceras zizanioides</i> (Humb., Bonpl. and Kunth) Dandy	H	R.B. Majumdar 74158	Barak RF, Fulertal, Jiri RF
<i>Arundinella bengalensis</i> (Spreng.) Druce	H	H.A. Barbhuiya 35, 41, 423	Borail WLS, Duhalia RF
<i>Axonopus compressus</i> (Sw.) P.Beauv.	H	H.A. Barbhuiya 269	Throughout the valley.
<i>Bambusa balcooa</i> Roxb. [Sil Barua, Teli Barua]	S	R.B.Majumdar 73275	Monierkhal
<i>Bambusa bambos</i> (L.) Voss [Ketua, Ketuasi]	S	H.A. Barbhuiya 285	Duhalia RF, Longai RF
<i>Bambusa cacharensis</i> R.B.Majumdar [Betua]	S	R.B. Majumdar 74265B	Throughout the valley.
<i>Bambusa jaintiana</i> R.B.Majumdar	S	H.A. Barbhuiya 1040	Borail WLS.
<i>Bambusa multiplex</i> (Lour.) Raeusch. ex Schult. [Kankoi]	S	H.A. Barbhuiya 69	Borail WLS.
<i>Bambusa nutans</i> Wall. ex Munro [Peechli]	S	H.A. Barbhuiya 285	Badsahi tilla RF, Inner Line RF.
<i>Bambusa pallida</i> Munro [Burwal, Bakhal]	S	H.A. Barbhuiya 286	Throughout the valley.
<i>Bambusa polymorpha</i> Munro [Betua, Jama]	S	N.L. Bor 13904	Duhalia RF, Lakhipur, Kukicherra.
<i>Bambusa tulda</i> Roxb. [Mirtenga]	S	R.S. Rao 9097	Katakhal RF.
<i>Bambusa vulgaris</i> Schrad.	S	N.L. Bor 13905	Barak RF, Sonai RF.
<i>Brachiaria reptans</i> (L.) C.A.Gardner and C.E.Hubb.	H	R.B. Majumdar 73024	Throughout the valley.
<i>Brachiaria subquadripara</i> (Trin.) Hitchc.	H	R.B. Majumdar 73500	Fulertal, Jiri RF.
<i>Centotheca lappacea</i> (L.) Desv.	H	H.A. Barbhuiya 388	Bhuban Hill, Borail WLS, Duhalia RF, Lakhipur.
<i>Chloris barbata</i> Sw.	H	H.A. Barbhuiya 1043	Throughout the valley.
<i>Chrysopogon aciculatus</i> (Retz.) Trin. [<i>Lengra</i>]	H	H.A. Barbhuiya 433	Throughout the valley.
<i>Chrysopogon zizanioides</i> (L.) Roberty	H	R.B. Majumdar 74290	Inner Line RF, Loharbond
<i>Coix lacryma-jobi</i> L. var. <i>lacryma-jobi</i>	H	R.B. Majumdar 74241	Dholai, Ramprasadpur, Nagakhal, Matijuri,
<i>Coix lacryma-jobi</i> L. var. <i>ma-yuen</i> (Rom.Caill.) Stapf	H	R.N. De 20818	Chekercham taungya
<i>Cynodon dactylon</i> (L.) Pers. [<i>Dubri-Gash</i>]	H	H.A. Barbhuiya 359	Throughout the valley
<i>Cyrtococcum oxyphyllum</i> (Steud.) Stapf	H	R.B. Majumdar 73137	Katakhal RF, Sonai RF, Bhuban Hill
<i>Cyrtococcum patens</i> var. <i>latifolium</i> (Honda) Ohwi	H	H.A. Barbhuiya 449	Duhalia RF.
<i>Dendrocalamus giganteus</i> Munro [Jai]	S	H.A. Barbhuiya 1044	Throughout the valley
<i>Dendrocalamus hamiltonii</i> Nees and Arn. ex Munro [<i>Pecha</i>]	S	Tara Kishor Gupta s.n.	Duhalia RF, Inner Line RF, Singla RF.
<i>Dendrocalamus longispathus</i> (Kurz) Kurz [Bulka]	S	R.B. Majumdar 62196	Hawaithang, Dholai, Inner Line RF.
<i>Dendrocalamus strictus</i> (Roxb.) Nees [Barua]	S	H.A. Barbhuiya 1047	Throughout the valley
<i>Digitaria ciliaris</i> (Retz.) Koeler	H	R.B. Majumdar 73451	Throughout the valley.
<i>Digitaria jubata</i> (Griseb.) Henrard	H	H.A. Barbhuiya 1048	Throughout the valley.
<i>Digitaria violascens</i> Link	H	H.A. Barbhuiya 930	Borail WLS
<i>Dinochloa macclellandii</i> (Munro) Kurz	S	H.A. Barbhuiya 147	Duhalia RF, Longai RF.
<i>Echinochloa colonum</i> (L.) Link	H	R.B. Majumdar 73311	Nagakhal, Lakhipur, Duarbond, Kukicherra
<i>Echinochloa crusgalli</i> P. Beauv.	H	R.B. Majumdar 73405.	Loharbond, Dholai
<i>Echinochloa stagnina</i> (Retz.) P.Beauv.	H	R.B. Majumdar 73178	Bhuban Hill, Son Beel
<i>Eleusine indica</i> (L.) Gaertn.	H	H.A. Barbhuiya 210	Borail WLS
<i>Enteropogon dolichostachyus</i> (Lag.) Keng	H	H.A. Barbhuiya 1041	Gumra
<i>Eragrostis unioloides</i> (Retz.) Nees ex Steud.	H	R. B. Majumdar 73202	Moinerkhal
<i>Eragrostis zeylanica</i> Nees and Meyen	H	H.A. Barbhuiya 1049	Throughout the valley.
<i>Gigantochloa albociliata</i> (Munro) Kurz [Kalisuneti]	S	H.A. Barbhuiya 271	Longai RF, Singla RF.
<i>Gigantochloa nigrociliata</i> (Buse) Kurz	S	U.N. Kanjilal 4896	Chhatacheera Hill
<i>Gigantochloa parvifolia</i> (Gamble) T.Q.Nguyen	S	H.A. Barbhuiya 148	Katakhal RF
<i>Hackelochloa granularis</i> (L.) Kuntze	H	R.B. Majumdar 73442	Dholai
<i>Hemarthria longiflora</i> (Hook.f.) A.Camus	H	N.L. Bor 21398	Throughout the valley.
<i>Hemarthria protensa</i> Steud.	H		Throughout the valley.
<i>Ichnanthus pallens</i> var. <i>majus</i> (Nees) Stieber	H	C.S. Purkayastha 10947	Throughout the valley.
<i>Imperata cylindrica</i> (L.) Raeusch. [Ulu]	H	H.A. Barbhuiya 261	Throughout the valley.
<i>Isachne clarkei</i> Hook.f.	H	H.A. Barbhuiya 218	Borail WLS
<i>Isachne miliacea</i> Roth	H	R. B. Majumdar 74284	Loharbond
<i>Isachne sylvestris</i> Ridl.	H		Duarbond
<i>Leersia hexandra</i> Sw.	H	H.A. Barbhuiya 208	Throughout the valley.
<i>Leptochloa chinensis</i> (L.) Nees	H	R.B. Majumdar 74172	Fulertal, Murcakhal
<i>Leptochloa filiformis</i> Roem. and Schult.	H	H.A. Barbhuiya 145	Throughout the valley.
<i>Lophatherum gracile</i> Brongn.	H	R.B. Majumdar 73062	Bhuban Hill
<i>Melocalamus compactiflorus</i> (Kurz) Benth.	S	U.N. Kanjilal 4816	Sonai RF, Inner Line RF.
<i>Melocalamus indicus</i> R.B. Majumdar	S	H.A. Barbhuiya 525	Borail WLS, Sonai RF, Bhuban Hill
<i>Melocalamus mastersii</i> (Munro) R.B.Majumdar [Beti-bans]	S		Longai RF.
<i>Melocanna baccifera</i> (Roxb.) Kurz [Muli]	S	R.B. Majumdar 73401	Duhalia RF, Dholai, Inner Line RF, Katakhal RF.
<i>Neyraudia reynaudiana</i> (Kunth) Keng ex Hitchc.	H	C.S. Purkayastha 10978	Longai RF.

TABLE 2. CONTINUED.

TAXON	HABIT	VOUCHER SPECIMENS	OCCURRENCE
<i>Oplismenus compositus</i> (L.) P.Beauv.	H	H.A. Barbhuiya 362	Duhalia RF.
<i>Oryza latifolia</i> Desv.	H		Patheria RF.
<i>Oryza officinalis</i> Wall ex Watt.	H	R.B. Majumdar 73324	Joysing
<i>Oryza sativa</i> L. [Dhan]	H	H.A. Barbhuiya 217	Throughout the valley.
<i>Ottochloa nodosa</i> (Kunth) Dandy	H	R.B. Majumdar 73192	Throughout the valley.
<i>Panicum auritum</i> J.Presl ex Nees	H	R.B. Majumdar 73255	Nagakhal, Barunkhal, Bhuban Hill.
<i>Panicum brevifolium</i> L.	H	R.B. Majumdar 73355	Ramnagar.
<i>Panicum humidorum</i> Buch.-Ham. ex Hook.f.	H	H.A. Barbhuiya 450	Borail WLS.
<i>Panicum khasianum</i> Munro ex Hook.f.	H	H.A. Barbhuiya 10	Borail WLS.
<i>Panicum latifolium</i> L.	H	H.A. Barbhuiya 272	Throughout the valley.
<i>Panicum luzonense</i> J.Presl	H	H.A. Barbhuiya 146	Throughout the valley.
<i>Panicum notatum</i> Retz.	H	H.A. Barbhuiya 424	Duhalia RF.
<i>Panicum paludosum</i> Roxb.	H	H.A. Barbhuiya 205	Bhuban Hill, Gumra
<i>Panicum repens</i> L.	H	R.B. Majumdar 73413	Lakhipur
<i>Panicum sarmentosum</i> Roxb.	H	R.N. De 20152	Jirimukh
<i>Paspalidium punctatum</i> (Burm.) A.Camus	H	R.B. Majumdar 73254	Throughout the valley.
<i>Paspalum conjugatum</i> P.J.Bergius	H	R.B. Majumdar 57235	Loharbond
<i>Paspalum scrobiculatum</i> L.	H	R.B. Majumdar 73484	Sonai R.F.
<i>Phragmites karka</i> (Retz.) Trin. ex Steud.	H	H.A. Barbhuiya 1042	Borail WLS
<i>Pogonatherum crinitum</i> (Thunb.) Kunth	H	R.B. Majumdar 73490	Upper and Lower Jiri RF.
<i>Pseudoraphis minuta</i> (Mez) Pilg.	H	H.A. Barbhuiya 1046	Throughout the valley.
<i>Pseudostachyum polymorphum</i> Munro [Khaug, Bajail]	S		Duhalia RF., Singla R.F.
<i>Saccharum longisetosum</i> (Andersson) V.Naray. ex Bor	H	C.S. Purkayastha 10977	Longai RF.
<i>Saccharum officinarum</i> L. [Kuiet, Kushier]	S	H.A. Barbhuiya 1045	Throughout the valley.
<i>Saccharum procerum</i> Roxb. [Bhutang]	S	R.N. De 20071	Jirimukh, Loharbond, Irongmara
<i>Saccharum spontaneum</i> L.	S	H.A. Barbhuiya 204	Borail WLS, Nagakhal, Loharbandh, Bhuban Hill
<i>Sacciolepis interrupta</i> (Willd.) Stapf	H	R.B. Majumdar 74171	Bhuban Hill
<i>Schizostachyum dullooa</i> (Gamble) R.B.Majumdar [Dalu, Chunga Bans]	S	R.B. Majumdar 84215	Katakhal RF, Bhubahn Hill, Lailapur, Duhalia RF.
<i>Schizostachyum mannii</i> R.B.Majumdar	S	H.A. Barbhuiya 906	Katakhal RF, Borail WLS
<i>Setaria clivalis</i> (Ridl.) Veldkamp	H	H.A. Barbhuiya	Throughout the valley.
<i>Setaria palmifolia</i> (J.Koenig) Stapf	H	R.B. Majumdar 73219	Monierkhal
<i>Setaria pumila</i> (Poir.) Roem. and Schult.	H	R.B. Majumdar 73309	Nagakhal
<i>Sporobolus diandrus</i> (Retz.) P.Beauv.	H	H.A. Barbhuiya 420	Duhalia RF.
<i>Sporobolus fertilis</i> (Steud.) Clayton	H	R.B. Majumdar 73038	Bhuban Hill
<i>Sporobolus indicus</i> (L.) R.Br.	H	H.A. Barbhuiya 217	Borail WLS, Duhalia R.F.
<i>Themeda villosa</i> (Poir.) A.Camus	H	H.A. Barbhuiya 812	Borail WLS, Sonai R.F. Ramprasadpur
<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda [Rema]	H	H.A. Barbhuiya 560	Borail WLS, Sonai R.F., Badshai Tilla RF.
<i>Vossia cuspidata</i> (Roxb.) Griff.	H	H.A. Barbhuiya 1043	Throughout the valley.

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LITERATURE CITED

Barooah, C and S.K. Borthakur. 2003. *Diversity and distribution of Bamboos in Assam*. Dehra Dun: Bishen Singh Mahendra Pal Singh. 223 p.

Bhattacharjee, P. 2002. Study of the Bamboos of Karimganj District, Assam, India; p. 117-123. In M.K. Bhattacharya, M. Dutta Chowdhury and P.B. Mazumdar (ed.). *Biodiversity of Assam and Its Conservation*. Assam: Department of Botany, Karimganj College, Karimganj.

Bor, N.L. 1940. *Flora of Assam*. Vol. V. Shillong: Government of Assam. 480 p.

Bor, N.L. 1960. *The grasses of Burma, Ceylon, India and Pakistan*. London: Pergamon Press. 767 p.

Champion, H.G. and A.K. Seth. 1968. *A revised survey of the forest types of India*. New Delhi: Manager of Publications, Govt. of India. 404 p.

Chen, S., D. Li, G. Zhu, Z. Wu, S. Lu, L. Liu, Z. Wang, B Sun, Z. Zhu, N. Xia, L. Jia, Z. Guo W. Chen, X. Chen, G. Yang, S.M. Phillips, C. Stapleton, R.J. Soreng, S.G. Aiken, N.N. Tzvelev, P.M. Peterson, S.A. Renvoize, M.V. Olonova and K.H. Ammann. 2006. Poaceae; p. 1-651 In Z.Y. Wu, P.H. Raven and D.Y. Hong (ed.). *Flora of China*. Volme XII. St. Louis: Science Press, Beijing, and Missouri Botanical Garden Press.

Chowdhury, S. 2005. *Assam's Flora Present Status of Vascular Plants*. Guwahati: Assam Science Technology and Environmental Council. 368 p.

Gamble, J.S. 1896. The Bambuseae of British India. *Annals of the Royal Botanic Garden, Calcutta* 7: 1-133.

GPWG 2001. Phylogeny and Subfamilial Classification of the Grasses (Poaceae). *Annals of the Missouri Botanical Garden* 88(3): 373-457.

Gupta K.K. 1972. Flowering in different species of bamboos in Cachar district of Assam in recent times. *Indian Forester* 98 (2): 83-85.

Hooker, J.D. 1897. *The flora of British India*. Vol VII. L. Kent: Reeve and Co., Ltd. 842 p.

Nair, V.J. and G.V.S. Murthy. (ed.) 2012. *Bibliography of Indian Poaceae*. Kolkata: Botanical Survey of India. 223 p.

Seethalakshmi, K.K. and M. Kumar. 1998. *Bamboos of India - A Compendium*. Peechi: Kerala Forest Research Institute. 345 p.

Shantz, H.L. 1954. The place of grasslands in the earth's cover of vegetation. *Ecology* 35: 143-145.

Shukla, U. 1996. *The grasses of North-eastern India*. Jodhpur: Scientific Publishers. 404 p.

Tewari, D.N. 1992. *A monograph on Bamboos*. Dehra Dun: International Book Distributors. 498 p.

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